

Technological expertise from Liebherr

Application technology and
continuation training



LIEBHERR

Mastering tasks, achieving objectives – Application technology at Liebherr



The economic production of high quality gearing is subject to many technological challenges. Consequently, we develop technologies for gear hobbing, gear shaping and gear grinding for our customers on an ongoing basis. Here, the knowledge is imparted to the customers by our application technicians. Only through the optimal combination of technology and tools can customers get the most out of their machines in terms of performance and productivity.

Our application technicians support customers around the world to support their diverse problems:

- Technological support with process configuration
- Selection of suitable tool systems and processing strategies and cutting data
- Support during trials in customer factories, e.g. when new technologies are introduced
- Analysis and assessment of technical processes at the customer's site
- Optimization of technical data, service life of tools and workpiece quality
- Economical considerations of processes
- Troubleshooting acute problems in production

Technological advice

- Advice in the selection of procedures and processing strategy
- Consideration of recent innovations and potential estimation
- Development of individual tool and production concepts
- Definition of cutting data and cycle times as well as achievable component quality



Problem analysis

- Analysis and approaches to solve current problems
(e.g. improvement in quality, extension of tool life, reduction in cycle time ...)
- Support with troubleshooting and localizing causes
- Development of a catalogue of measures and definition of a testing schedule



Telephone advice

- Fast help with technical problems
- Brief initial analysis of current problems
- Proposals for immediate measures
- Preparation for deployment of an application technician onsite



Support with trials

e.g. when new technologies are introduced

- Support when testing new gear manufacturing processes
- Planning, assistance and documentation of customer trials
- Support with production start of new processes introduction



Process optimization

- Improvement in component quality and increase in process reliability
- Improvement in productivity
- Extension of service life of tools
- Reduction in unit costs



Continuous training means continuous development – Gear seminars at Liebherr



The demand for gear knowledge is continuing to rise. Liebherr meets this demand with its programme of courses. From gear makers to large volume manufacturers, a programme is offered to cater for the demand. Our aim is to convey our knowhow to the customer to enhance employees' understanding of the technology and thereby make their day-to-day production work easier. The dissemination of knowledge in our training courses establishes fundamental knowledge, closes gaps and encourages new thought-provoking impulses as well as own further developments.

The range of training courses include:

- General outline courses for newcomers
- Technology-related foundation courses for newcomers
- Advanced training courses for intermediate learners and those with years of experience
- Theory & practical courses for intermediate learners and experts
- Technologies: Gear hobbing, gear shaping and gear grinding
- For all module sizes from automotive to wind power
- Supplementary training on the use of time calculation programmes possible
- Courses held at Liebherr's training facility or also directly at the customer's site
- Offered in German, English and Chinese (other languages on request)



For questions about training courses,
please contact us directly:
seminar@liebherr.com or find details
on the internet at:
<http://www.liebherr.com/GT/de-DE/118121.wfw>

...or directly at the customer's site



In addition to our inhouse training, we also offer all courses directly at the customer's site. We pass on our knowledge to your staff in either small or large groups and support you in qualifying your employees in all areas of your gear production.

From gear makers to large volume manufacturers



Expertly trained – Overview of courses



Your expectations of our machines are very high. We also have these high expectations of our employees and pay close attention to ensure that we continue to train ourselves so that your co-workers can be kept at the latest state of gear manufacturing technology. This ensures that you gain the maximum benefit from our training courses. The range

of courses covers the subject areas of machine operation, machine maintenance and technology gear production. The contents of the training courses are adaptably structured to meet the different requirements of the participants.

Outline course

- Types of gearing
- Gear teeth and gear wheel concepts
- Gear pairing concepts
- Processes for manufacturing cylindrical gears
- Fundamentals of metal cutting technology
- Fundamentals of gear forming and gear cutting
- Processes of hard precision engineering
- Fundamentals of metal cutting technology with geometrically undefined cutter
- Essentials of profile and hob grinding
- Fundamentals of test instrument technology for gearing and statistics
- Gearing anomalies and their causes
- Practical implementation of SPC when cutting spur gears



Basic course

- Types of gears
- Definition of gear teeth and gear terminology
- Gear pairing definitions
- Processes for manufacturing cylindrical gears
- Fundamentals of metal cutting technology
- Fundamentals of respective gear manufacturing processes
- Tools and technology
- Fundamentals of gear measuring technology



Advanced course

- Fundamentals and advanced knowledge of respective gear manufacturing processes
- Design and functionality of the machines
- Tool and process configuration
- Manufacture of special gears
- Process integration
- Fundamentals of gear measuring
- Gear anomalies and their causes
- Practical implementation of SPC for gear cutting



Theory & practical course

Theory

- Fundamentals and advanced knowledge of gear manufacturing processes
- Tool and process configuration
- Types of wear and tool life criteria
- Fundamentals of gear measuring technology and SPC
- Gear anomalies and their causes

Practice

- Process analysis with customer example
- Quality rating and assessment of wear
- Discussion of potential for improvement



PC training, time calculation

- Fundamentals of respective gear manufacturing processes
- Tools and technology
- Introduction to process configuration
- Use of time calculation program
- Creating time studies
- Constraints and technological limitations
- Economic feasibility study



Machine tools and automation systems from Liebherr

With about sixty years of industrial experience, Liebherr is one of the world's leading manufacturers of CNC gear cutting machines, gear cutting tools and automation systems. The company's innovative products are the result of pioneering ideas, highly qualified staff and state-of-the-art manufacturing systems at each of their locations. They are characterised by economy, ease of use, quality and reliability in combination with a high degree of flexibility.

Liebherr employs roughly 1200 staff in the area of machine tools and automation technology and has production facilities in Kempten and Ettlingen (Germany), Collegno (Italy), Saline (Michigan, USA) and Bangalore (India). They are supported by expert and reliable marketing and service specialists at a large number of locations worldwide.



System solutions in the area of machine tools

Included in the production programme are gear hobbing machines, gear shaping machines and hobbing and profile grinding machines, all noted for their high degree of stability and availability. Liebherr can supply all technologies required for the manufacture of high quality gears and continues to develop these technologies. Particular importance is attached to the energy efficiency of the machines.

Gear cutting machines from Liebherr are supplied to renowned manufacturers of gears and gearboxes as well as large-scale slewing rings worldwide. They are in demand primarily from the automotive and construction machinery industries and also increasingly from the wind power industry for the manufacture of gears for wind turbines.

High quality gear cutting tools

Liebherr manufactures high quality, precision tools for the soft and hard machining of gears and all Liebherr gear cutting machines are fitted with Liebherr tools. The range also includes Lorenz bearing tools and products customised for specific customer applications.

Automation systems for a broad range of applications

Liebherr has a wide range of products for linear portals, pallet-handling systems, conveyor systems and robot integration for projects in all areas of production and can provide above-average availability of systems.

www.liebherr.com

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